

CLAIMS

- 1 An optical scanning device for scanning at least a first type of information carrier (11)
having a first information layer (111) and a first transparent layer (112) of a first thickness
5 and a second type of information carrier (12, 411) having a second information layer (121,
412) and a second transparent layer (122, 413) of a second thickness greater than the first
thickness, said optical scanning device comprising means (401, 402) for generating at least a
first and a second radiation beam (403, 404), and an objective lens (10, 20, 408) comprising
10 at least an annular part (101, 201) having a first numerical aperture and a central part (102,
203) having a second numerical aperture higher than the first numerical aperture, wherein the
first information layer is intended to be scanned by the first radiation beam through the
central part of the objective lens and the first transparent layer, and the second information
layer is intended to be scanned by the second radiation beam through the annular part of the
objective lens and the second transparent layer.
- 15 2 An optical scanning device as claimed in Claim 1, wherein said objective lens
comprises an optical axis and a cavity located around said optical axis, said cavity having a
substantially cylindrical shape, the bottom of said cavity forming the central part of the
objective lens.
- 3 3 An optical scanning device as claimed in Claim 1, wherein the second numerical
20 aperture is higher than 0.7 and the first numerical aperture is more than ten per cent lower
than the first numerical aperture.
- 4 4 An optical scanning device for scanning at least a first type of information carrier
having a first information layer and a first transparent layer of a first thickness and a second
type of information carrier having a second information layer and a second transparent layer
25 of a second thickness greater than the first thickness, said optical scanning device comprising
means for generating at least a first and a second radiation beam, and a lens assembly
comprising a first lens (30) with an annular part (301) having a first numerical aperture and a
central part (302), and a second lens (31), the second lens and the central part of the first lens
forming a dual-element objective lens having a second numerical aperture higher than the
30 first numerical aperture, wherein the first information layer is intended to be scanned by the
first radiation beam through the dual-element objective lens and the first transparent layer,
and the second information layer is intended to be scanned by the second radiation beam
through the annular part of the first lens and the second transparent layer.

5 An objective lens (10, 20) comprising at least an annular part (101, 201) having a first numerical aperture and a central part (102, 203) having a second numerical aperture, wherein the second numerical aperture is higher than the first numerical aperture.

6 An objective lens as claimed in claim 5, said lens comprising an optical axis and a
5 cavity located around said optical axis, said cavity having a substantially cylindrical shape, the bottom of said cavity forming the central part of the objective lens.

7 An objective lens as claimed in claim 5, wherein the second numerical aperture is higher than 0.7 and the first numerical aperture is more than ten per cent lower than the first numerical aperture.

10 8 An objective lens as claimed in claim 5, wherein the first numerical aperture is between 0.35 and 0.7 and the second numerical aperture is higher than 0.7.

9 An objective lens as claimed in claim 5, wherein the first numerical aperture is between 0.35 and 0.7 and the second numerical aperture is higher than 0.8.

10 10 A lens assembly comprising a first lens (30) with an annular part (301) having a first
15 numerical aperture and a central part (302), and a second lens (31), the second lens and the central part of the first lens forming a dual-element objective lens having a second numerical aperture, wherein the second numerical aperture is higher than the first numerical aperture.